

SECTION 200

EARTHWORK

200.1 GENERAL

This section contains the requirements for earthwork activities associated within rights-of-way easements, or open areas. These activities include: clearing and grubbing, roadway excavation, fill construction, borrow excavation, and open area land leveling. Earthwork requirements for channels, dikes and dams are contained in Section 600, Channel Construction.

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SECTION 201

CLEARING AND GRUBBING

201.1 GENERAL

This work shall consist of removing natural and man-made objectionable material from the right-of-way, construction areas, road approaches, material and borrow sites, areas through which ditches and channels are to be excavated, and such other areas as may be shown on the plans. Clearing and grubbing shall be performed in advance of grading operations except that in cuts over 3 feet in depth, grubbing may be done simultaneously with excavation, provided stumps, roots, embedded wood, foundations and slabs are removed as specified. Clearing and grubbing shall be in accordance with the requirements herein specified, such as erosion control requirements. Demolition of structures, other than foundations or slabs, shall be as shown on the plans.

201.2 REFERENCES

201.3 PRESERVATION OF PROPERTY

Existing improvements, adjacent property, utility and other facilities, and trees and plants not to be removed shall be protected from injury or damage resulting from the CONTRACTOR's operations. Only trees and plants designated or marked for removal by the ENGINEER shall be removed.

201.4 CONSTRUCTION METHODS

201.4.1 The natural ground surface shall be cleared of vegetable growth, such as trees, tree stumps, logs, roots or downed trees, brush, grass, weeds, and surface boulders, as well as fences, walls, rubbish, foundations and slabs.

201.4.2 Unless otherwise shown on the plans, the entire area of the project within the limit lines specified below shall be cleared and grubbed. No payment will be made to the CONTRACTOR for clearing and grubbing outside these limits, unless such work is authorized by the ENGINEER.

201.5 LIMIT LINES: Except when limit lines for clearing and grubbing are shown on the plans or are staked by the ENGINEER, clearing and grubbing shall extend only within reasonable limits of the work area.

201.6 REMOVAL OF TREES AND TREE BRANCHES

201.6.1 Trees shall be removed in such a manner as not to injure standing trees,

plants, and improvements which are to remain. Tree branches extending over a roadway and which clear finish grade by 12 feet or less shall be cut off close to the boles in a workmanlike manner.

201.6.2 Trees requiring trimming to facilitate normal construction operations shall be trimmed by a tree surgeon.

201.7 REMOVAL AND DISPOSAL OF DEBRIS

Debris to be removed shall be disposed of outside the right-of-way at a location satisfactory to the ENGINEER, except when burning of combustible debris is permitted. The area to be graded and adjacent areas shall be left with a neat and finished appearance. No accumulation of flammable material shall remain on or adjacent to the property line. In case burning precedes construction operations, the piles may be placed in the center of the area; otherwise, the piles shall be placed in the most convenient location at the side of the area and beyond slope lines where they may be burned without damage to surrounding forest cover or adjacent property. Burning shall be done in conformance with local regulations and at such times and in such manner as to prevent the fire from spreading to areas adjoining the construction site. In areas where burning is prohibited by local regulations, all removed material shall be disposed of outside the construction area.

201.8 REMOVAL AND DISPOSAL OF SALVAGEABLE ITEMS

Items and materials of salvage value as shown on the plans or as determined by the ENGINEER, unless incorporated in the new work, shall remain the property of the OWNER and shall be delivered to approved storage areas as directed by the ENGINEER. Such items and materials shall be carefully removed and delivered in such a manner as to permit re-use.

201.9 MEASUREMENT AND PAYMENT

201.9.1 CLEARING AND GRUBBING:

201.9.1.1 When the proposal includes an item for clearing and grubbing, the quantity for measurement shall be as indicated in the Bid Proposal.

201.9.1.2 The unit price per acre paid for clearing and grubbing shall include full compensation for furnishing all labor, materials, tools, equipment, and

incidentals and for doing all the work involved in clearing and grubbing as shown on the plans, as provided in these specifications and as directed by the ENGINEER, including the removal and disposal of resulting material.

201.9.1.3 When the Bid Proposal does not include a pay item for clearing and grubbing as above specified and unless otherwise specified in the Supplementary Specifications, full compensation for any necessary clearing and grubbing required to perform construction operations specified shall be considered as included in the price paid for other items of work and no additional compensation will be allowed therefor.

201.9.2 REMOVAL AND DISPOSAL OF TREES:
If the Bid Proposal includes separate estimates of quantities for the removal of trees, the trees shall be classified by size as follows:

201.9.2.1 Trees less than 12 inches in circumference at 3 feet above the original ground surface shall be considered as included in the price for clearing and grubbing or excavation, and no additional compensation will be allowed therefor.

201.9.2.2 Trees between 12 and 30 inches in circumference shall be measured as a unit price for each tree in the item provided in the Bid Proposal for trees of this dimension.

201.9.2.3 Trees more than 30 inches in circumference shall be measured as a unit price for each tree in the item provided in the Bid Proposal for trees of this dimension.

SECTION 202
ROADWAY EXCAVATION

202.1 GENERAL

Roadway excavation shall consist of excavation involved in the grading and construction of roadways, except structure excavation, trench excavation, and any other excavation separately designated.

202.2 REFERENCES

202.2.1 This publication Section 204

202.3 UNSUITABLE MATERIAL

202.3.1 Unsuitable materials include all material that contains debris, roots, organic matter, stones or boulders too large to be used in the intended construction, or other materials that are determined by the ENGINEER to be unsuitable. Otherwise suitable materials which are unsuitable due to excess moisture content will not be classified as unsuitable material unless it cannot be dried by manipulation, aeration or blending with other materials satisfactorily as determined by the ENGINEER.

202.3.2 Material that is unsuitable for the intended use shall be excavated and removed from the site or otherwise disposed of as approved by the ENGINEER.

202.3.3 The removal and disposal of such unsuitable material will be paid for as roadway excavation for the quantities involved.

202.4 ROCK EXCAVATION

202.4.1 Rock excavation shall consist of igneous, metamorphic and sedimentary rock, naturally in place, which cannot be excavated without blasting or the use of rippers, and all boulders or other detached stones having a volume of one (1) cubic yard or more, as determined by physical measurements or visually by the ENGINEER. Where any portion of the excavation contains strata classified as Rock Excavation and the various strata are parted with strips or strata not classified as Rock Excavation which constitute twenty-five (25) percent or less of the total thickness of the rock plus non-rock layers, the entire volume of the combined layers shall be paid as Rock Excavation. Removal of Surface boulders in excess of 1 cubic yard in volume shall be paid for under Clearing and Grubbing, unless specifically identified as Rock Excavation.

202.4.2 OVERSHOOTING: Excessive blasting will not be permitted. Material outside the authorized cross section which may be shattered or loosened because of blasting shall be removed at the CONTRACTOR'S expense. The CONTRACTOR shall discontinue any method of blasting which leads to overshooting and is dangerous to the public or destructive to property or to natural features.

202.5 SLIDES AND SLIPOUTS

202.5.1 Material outside of planned roadway or ditch slopes which in the opinion of the ENGINEER is unstable and constitutes potential slides, material which has intruded into the roadway channel or ditch, and material which has escaped from new or old embankments shall be excavated and removed. The material shall be excavated to designated lines or slopes either by benching or in such a manner as approved by the ENGINEER. Such material shall be used in the construction of the embankments or disposed of as approved by the ENGINEER.

202.5.2 The removal and disposal of slide and slipout material as above specified not resulting from overshooting as defined in Subsection 202.4 will be paid for at the contract price for excavation for the quantities involved. However, if due to the character of the work the removal and disposal of such material is not properly compensable at the contract price for roadway excavation, the work may be paid for as extra work provided the CONTRACTOR requests in writing such payment prior to performing the work. Authorization for the work will be by change order.

202.5.3 Only those quantities of slide or slipout material which are actually removed as ordered by the ENGINEER will be approved for payment.

202.5.4 The above provisions shall not be so construed as to relieve the CONTRACTOR from his obligation to maintain all slopes true and smooth.

202.6 SLOPES

202.6.1 Excavation slopes shall be finished in conformance with the lines and grades shown on the plans. Debris and loose material shall be removed. When completed, the average plane of the

slopes shall conform to the slopes indicated on the plans and no point on the completed slopes shall vary from the designated plane by more than 6 inches measured at right angles to the slope. Except where excavation is in rock no point shall vary more than 2 feet from the designated plane of the slope. In no case shall any portion of the slope encroach on the construction area.

202.6.2 Tops of excavation slopes and ends of excavations shall be rounded as shown on the plans or as directed by the ENGINEER, and these quantities will not be included in the payment for excavation. This work will be considered as a part of finishing slopes, and no additional compensation will be allowed therefor.

202.6.3 Embankment slopes shall be finished in conformance with lines and grades shown on the plans. When completed, the average plane of embankment slopes shall conform to slopes indicated on the plans, and no point on completed slopes shall vary from the designated plane by more than 6 inches measured at right angles to the slope.

202.7 SURPLUS MATERIAL

202.7.1 Unless otherwise shown on the plans, specified in the Supplementary Specifications, or approved by the ENGINEER, no surplus excavated material shall be disposed of within the construction area. The CONTRACTOR shall make all arrangements for disposal of the material at offsite locations as may be approved by the ENGINEER and shall, upon request, file with the ENGINEER the written consent of the owner of the property upon which he intends to dispose of such material.

202.7.2 If the quantity of surplus material is shown in the plans or specified in the Supplementary Specifications, the quantity shown or specified is approximate only. The CONTRACTOR shall satisfy himself that there is sufficient material available for the completion of the embankments before disposing of any indicated surplus material inside or outside the area. Any shortage of material caused by premature disposal of surplus material by the CONTRACTOR shall be replaced by him, and no compensation will be allowed the CONTRACTOR for such replacement.

202.8 SELECT MATERIAL

202.8.1 Select material shall be considered as material which can be

compacted to the densities specified in Section 204.

202.8.2 Select material encountered in excavation within the right-of-way shall be used for finishing the top portion of the roadbed or for constructing shoulders or used for structure backfill or used as shown on the plans or as directed by the ENGINEER.

202.8.3 Where practicable, select material shall be hauled directly from excavation to its final position in the construction prism and compacted in place, and such work will be paid for at the contract price for excavation.

202.8.4 Select material shall remain in place until it can be placed in final position as provided above, except, if ordered in writing by the ENGINEER, select material may be excavated and stockpiled at locations designated by him and later placed in final position in the construction prism.

202.8.5 Excavating select material and stockpiling, if required, will be paid for at the contract price for roadway excavation. Removing the select material from stockpiles and placing it in final position in the roadway prism will again be paid for at the contract price for roadway excavation, except that the quantities to be paid for will be determined from measurements of the material in the stockpiles prior to removal. No payment for stockpiling of select material will be made unless such stockpiling is ordered by the ENGINEER.

202.8.6 Topsoil placed along the tops of slopes in connection with erosion control work will not be considered as stockpiled material when determining pay quantities of earthwork.

202.9 MEASUREMENT AND PAYMENT

202.9.1 All earthwork shall be measured by the cubic yard in place at the time of excavation. The following earthwork operations will be measured as excavation for the quantities of material involved.

202.9.1.1 Excavating the construction area including public and private road approaches, connections, and driveways; excavating unsuitable material when shown on the plans or specified in the Supplementary Specifications; excavating slides and slipouts not resulting from over-shooting; excavating surplus material; excavating selected material and topsoil from within the limits of project and

removing such materials from stockpiles when stockpiling is ordered; and excavating local borrow.

202.9.2 Excavation beyond the authorized cross section will not be included in measurement or payment.

202.9.3 Rock excavation will be paid by the cubic yard in place, prior to start of construction and measured to limits of excavation specified on plans. No compensation will be made to the CONTRACTOR for excess rock excavation due to overshooting, nor for the cost of backfilling voids or depressions resulting from overshooting.

SECTION 204

FILL CONSTRUCTION

204.1 GENERAL

Fill construction shall consist of constructing roadway embankments (including the preparation of areas upon which they are to be placed), the placing and compacting of approved material within areas where unsuitable material has been removed; and the placing and compacting of suitable materials in holes, pits and other depressions.

204.2 REFERENCES

- 204.2.1 ASTM
D 1557
D 4254

204.3 PLACING

204.3.1 Unless otherwise specified, the upper 6 inches of the original ground area upon which fills are to be constructed shall be compacted to a density of not less than 90 percent of maximum density as determined by ASTM D 1557, or in soils containing less than 5 percent passing the #200 sieve, a minimum relative density of 70 percent as determined by ASTM D 4254.

204.3.2 Rocks, broken concrete, or other solid materials which are larger than 4 inches in greatest dimension shall not be placed in fill areas where piles are to be placed or driven.

204.3.3 When fill is to be made and compacted on hillsides or where new fill is to be compacted against existing fill or where embankment is built 1/2 width at a time, the slopes of original hillsides and old or new fills shall be started wherever the vertical cut of the next lower bench intersects the existing ground.

204.3.4 Material thus cut out shall be recompacted along with the new embankment material at the CONTRACTOR's expense, unless the width of the bench required exceeds 4 feet, in which case the excavated material in excess of 4 feet will be measured and paid for as excavation.

204.3.5 Clods or hard lumps of earth of 6 inches in greatest dimension shall be broken up before compacting the material in embankment, except as provided in the following paragraph.

204.3.6 When the fill material includes large rocky material or hard lumps, such

as hardpan or cemented gravel which cannot be broken readily, such material shall be well distributed throughout the fill. Sufficient earth or other fine material shall be placed around the larger material as it is deposited so as to fill the interstices and produce a dense, compact fill. However, such material shall not be placed within 2 feet of the finished grade of the fill.

204.3.7 Embankment construction shall not be performed when material is frozen.

204.4 COMPACTING

204.4.1 Fill shall be constructed in compacted layers of uniform thickness and each layer shall be compacted in accordance with the requirements herein specified with the following exception.

204.4.2 Where fills are to be constructed across low, swampy ground which will not support the weight of hauling equipment, the lower part of the embankment may be constructed by dumping successive loads of suitable material in a uniformly distributed layer of a thickness not greater than that necessary to support the equipment while placing subsequent layers, after which the remainder of the embankment shall be constructed in layers and compacted as specified.

204.4.3 The placing and compacting of approved material within the project (where unsuitable material has been removed, and the filling of holes, pits and other depressions has been accomplished) shall conform to all of the requirements herein specified for compacting fills.

204.4.4 The loose thickness of each layer of fill material before compacting shall not exceed 8 inches, except as provided in the following paragraph for rocky material. The ENGINEER may authorize roadway fill materials to be placed in layers in excess of 8 inches thickness if the CONTRACTOR can demonstrate that the required compaction can be achieved for the full depth of the lift. However, in no case shall the loose layer exceed 24 inches. Each layer shall be compacted in accordance with the following requirements to a density of not less than 90 percent of maximum density, as determined by ASTM D 1557, or in soils containing less than 5 percent passing the #200 sieve, a minimum relative density of 70 percent as determined by ASTM D-4254. In areas of new or widened roadways and

required appurtenances, the density of the upper 12 inches shall not be less than 95 percent as determined by ASTM D 1557.

204.4.5 When fill material contains by volume over 25 percent of rock larger than 6 inches in greatest dimension, the fill below a plane 3 feet below finished grade may be constructed in layers of a loose thickness before compaction not exceeding the maximum size of rock in the material but not exceeding 3 feet in thickness. When more than 65 percent is retained on the No. 4 sieve, moisture and density control is not required.

204.4.6 The interstices around the rock in each layer shall be filled with earth or other fine material and compacted. Broken portland cement concrete obtained from the project excavation will be permitted in the fill with the following limitations.

204.4.6.1 The maximum dimensions of any piece used shall be 6 inches.

204.4.6.2 Pieces larger than 4 inches shall not be placed within 12 inches of any structure.

204.4.6.3 Pieces larger than 2 1/2 inches shall not be placed within 12 inches of the subgrade for paving.

204.4.6.4 "Nesting" of pieces will not be permitted.

204.4.7 At locations where it would be impractical to use mobile power compacting equipment, fill layers shall be compacted to the specified requirements, by any approved method that will obtain the specified relative compaction.

204.4.8 At the time of compaction the moisture content of fill material shall be optimum plus or minus 2 percent. Fill material which contains excessive moisture shall not be compacted until the material is dry enough to obtain the required relative compaction. Full compensation for any additional work involved in drying fill material to the required moisture content shall be considered as included in the unit price per Bid Proposal and no additional compensation will be allowed. Fills shall be maintained to the grade and cross sections shown on the plans until the acceptance of the contract.

204.5 MEASUREMENT AND PAYMENT

Fill construction shall include excavation, placement, compaction and all

related work, and shall be measured in place after compaction. Payment will be made on the unit price per cubic yard for compacted fill unless otherwise noted on the Bid Proposal.

SECTION 205

BORROW MATERIAL

205.1 GENERAL

Borrow material shall consist of naturally occurring granular material, such as: pit-run gravel, sand, decomposed granite, or slide rock; and shall be free from wood, vegetation, or other deleterious matter, but shall contain sufficient sand or filler to permit proper compaction of the subgrade. The maximum size of this material shall not be greater than $\frac{2}{3}$ the compacted thickness of the course placed in the subgrade. The CONTRACTOR shall notify the ENGINEER sufficiently in advance of opening any material sites so that cross section elevations and measurements of the ground surface after stripping may be taken and sufficient time for testing the material will be allowed.

205.2 REFERENCES

205.2.1 This publication:

Section 202
Section 204

205.3 PLACING AND COMPACTING

Borrow shall be placed and compacted as specified in Section 204. The CONTRACTOR shall satisfy himself that there is sufficient space available in fill locations for placing any excavated material before placing borrow. Any excess excavation which develops as a result of placing imported borrow in advance of completing excavations shall be disposed of at the CONTRACTOR's expense in accordance with the provisions in Subsection 202.7 and a corresponding reduction in the quantity of borrow to be paid for will be made, for which the CONTRACTOR will have no claim for compensation. Borrow pits shall be excavated to regular lines to permit accurate measurement; depth of excavation throughout the areas of borrow pits shall be as uniform as practicable and the side slope shall be dressed to such slope as may be directed by the ENGINEER, leaving the borrow pit area in a clean and safe condition.

205.4 MEASUREMENT AND PAYMENT

205.4.1 Quantities of borrow outside of physical limits of the work will be measured as per cubic yard. Material excavated at the borrow site and not used on the work will be deducted from the computed quantities and no payment will be made therefor.

205.4.2 If borrow is acquired from a commercial pit, alternate methods of determining cubic yardage of borrow material delivered to the site may be used. Such alternate method shall be agreed to and documented by the ENGINEER and CONTRACTOR prior to the start of any borrow operation.

SECTION 207
LEAN FILL CONSTRUCTION

207.1 GENERAL

LEAN FILL CONSTRUCTION shall consist of filling shallow excavations, pipe zones in deep excavations and as authorized by the ENGINEER, with LEAN FILL, a flowable mixture of Portland cement, aggregates, admixtures and water. It shall be identified by a unique design mix number as defined by the supplier. A design mix, upon request by a supplier, may be authorized by the Public Works Department Construction division for use on City and City related projects for a period of 14 months, from the date of sampling of reference aggregates used in the job mix formula. A design mix shall not be used on a project without written authorization of the ENGINEER.

207.2 REFERENCES

- 207.2.1 American Society for Testing and Materials (Latest Edition) (ASTM).
- ASTM C31 Practice for Making and Curing Concrete Test Specimens in the Field
- ASTM C33 Specifications for Concrete Aggregates
- ASTM C94 Specifications for Ready-Mixed Concrete
- ASTM C138 Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
- ASTM C143 Test Method for Slump of Portland Cement Concrete
- ASTM C150 Specification for Portland Cement Concrete
- ASTM C172 Method of Sampling of Freshly Mixed Concrete
- ASTM C173 Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
- ASTM C192 Practice for Making and Curing of Concrete Test Specimens in the Laboratory
- ASTM C231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
- ASTM C260 Specification for Air-Entraining Admixtures
- ASTM C558 Test Methods for Moisture Density Relations of Soil-Cement Mixtures
- ASTM C618 Specification for Fly Ash and Raw or Calcined Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
- ASTM C685 Specifications for Concrete Made by Volumetric Batching and Continuous Mixing
- ASTM D1633 Test Method for compressive Strength of Molded Soil-Cement Cylinders
- ASTM D2922 Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

ASTM C3017 Standard Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

- 207.2.2 American Concrete Institute (ACI) (Latest Edition).
- ACI 211 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
- ACI 340.2R Placing Concrete by Pumping Methods

207.3 PORTLAND CEMENT

207.3.1 Portland cement to be either used or furnished under this specification shall conform to the requirements of ASTM C150. The type of cement shall be either Type I or Type II, "low alkali" (LA) cement.

207.3.2 The CONTRACTOR shall submit certification of compliance signed by the cement manufacturer, identifying the cement Type and source (plant location), stating the Portland cement furnished to the project, and or used in the concrete delivered to the project complies with this specification. If required, certification of the Portland cement used for each day's concrete placement, shall be submitted to the ENGINEER for each type of cement and each design mix used on the project.

207.3.3 Portland cement used in the manufacture of LEAN FILL for a project shall be of the same brand and type for all LEAN FILL batched and delivered to a project under the authorized design mix identification, unless authorized by the ENGINEER.

207.4 AGGREGATES

207.4.1 Aggregates shall be sampled and tested as prescribed in said ASTM specification. The CONTRACTOR shall obtain a certification of compliance in accordance with the requirements of SECTION 13, identifying the aggregates, reporting test results, and stating the aggregates comply with this specification.

207.5 AGGREGATE GRADING

207.5.1 The maximum nominal aggregate size shall be one (1) inch.

207.6 WATER

207.6.1 Water shall conform to the requirements of ASTM C94.

207.7 AIR ENTRAINING ADMIXTURES

207.7.1 Air entraining admixtures shall conform to the requirements of ASTM C260, as authorized by the ENGINEER.

207.8 MINERAL ADMIXTURES

207.8.1 Mineral admixtures shall be fly ash complying with the requirements of Class "F" fly ash as specified in ASTM C618 and Section 101 of this specification.

207.8.2 Mineral admixtures shall be proportioned by weight as required to improve pumpability.

207.9 PROPORTIONING

207.9.1 The CONTRACTOR shall be solely responsible for the LEAN FILL design mix proportions either batched at and/or delivered to the site. A design mix shall be prepared in a laboratory under the direct supervision of a Registered New Mexico Professional Engineer. The testing equipment used in the design/development testing shall be calibrated annually with calibration standards traceable to the National Bureau of Standards. Certificates of calibration shall be maintained at the laboratory for review by the ENGINEER. A copy of the certificates shall be submitted to the ENGINEER upon request. The mix shall be certified that it complies with the requirements of this specification.

207.9.1.1 The materials shall be proportioned such that if placed at maximum slump, the laboratory dry density, as determined from molded specimens, at 24 (+/- 4) hours, is equal to or greater than 95 per cent of the maximum dry density of the blended cement and aggregate, determined in accordance with ASTM D558. The dry density of the laboratory molded LEAN FILL specimens shall be computed based on the average unit weight of the compressive strength specimens, corrected for the moisture content at the time of testing.

207.9.2 The Portland cement content shall be one-half (1/2) sack, 47 lbs., per cubic yard in all LEAN FILL produced under this specification, except as noted herein, or as specified in the Supplemental Specifications, or plans or as authorized by the ENGINEER.

207.9.3 The combined aggregate gradation shall comply with the following limits.

SCREEN SIZE	% PASSING
1 in.	100
3/4 in.	95-100
3/8 in.	82-100
no. 4	70-100
no. 8	55-85
no. 16	38-60
no. 50	6-30
no. 100	2-10

The mix gradation, when plotted on a US Bureau of Public Road 0.45 Power Gradation Chart, shall be similar to the plots of the specified gradation limits in the shape of the characteristic gradation curve.

207.9.4 Air-entraining admixtures shall conform to the requirements of ASTM C260. Air entraining admixtures shall be proportioned to provide air entrainment of not less than 2 per cent, as authorized by the ENGINEER.

207.9.5 Water shall be proportioned as required.

207.9.6 The design mix shall be proportioned to provide a slump of not less than 5 inches and not greater than 8 inches.

207.9.7 The compressive strength of the design mix shall not exceed 60 psi at 28 days when sampled and tested in accordance with ASTM C172 and D1633, and as specified in this section.

207.9.8 Laboratory compressive strength test specimens shall consist of cylinders molded by pouring a sample of the design mix in two equal lifts, into drained rigid molds, conforming to the dimensional requirements of ASTM D558, having a capacity of 1/30, +/-0.0004, c.f., with an internal diameter of 4.0, +/-0.016, inches (4" dia. x 4.5" ht., nominal dimensions). Molds cut from PVC (SCHD40) pipe having the specified internal dimensions and volume of that specified in ASTM D558 may be used. Molds shall be free draining at the base. If molds complying with the requirements of ASTM D558 are used, they shall not be clamped to the base. A free draining base may be accomplished by setting the molds on plywood for molding and initial curing. The cylinders shall be cured in the molds for the first 24 +/-4 hours. After 24 +/-4 hours curing in the molds, the cylinders shall be extruded and cured until testing.

207.9.9 Laboratory strength test specimens shall be cured in accordance with ASTM C192. Test specimens shall not be cured in a curing tank.

207.9.10 Four (4) specimens shall be weighed, measured and tested for compressive strength in accordance with the requirements of ASTM D558 at one (1) day, seven (7) days, and two (2) at 28 days, respectively.

207.9.11 An optimum moisture maximum density relationship for the combined aggregates and cement, proportioned by weight as defined by the proposed blends of the aggregates and cement, shall be determined in accordance with the requirements of ASTM D558.

207.9.12 The LEAN FILL design mix submittal shall include but not be limited to the following information, as directed by the ENGINEER:

a. Certification of compliance of the design mix under the requirements of this specification in accordance with Section 13 of these specifications,

b. Certification of the component materials used in the design mix in accordance with Section 13 of these specifications,

c. Plastic characteristics of the design mix to include temperature, slump, air entrainment, wet unit weight, yield and cement factor,

d. Performance characteristics of the hardened LEAN FILL to include the compressive strength of all test specimens and the corresponding average compressive strength, compressive strength test shall be reported for 1 day, 7 days and 28 days laboratory cure,

e. Dry unit weight and moisture content of the compressive strength specimens at the time of testing, average dry unit weight for each test series reported as a percent of the maximum dry density as determined by ASTM D 558,

f. The optimum moisture maximum dry density relationship for the combined aggregates and cement and a graphical plot of the moisture density relationship as determined in accordance with ASTM D 558 in the laboratory.

207.10 BATCHING, MIXING AND DELIVERY

207.10.1 Batching, mixing and delivery shall conform to the requirements of either ASTM C94 or ASTM C685. The CONTRACTOR shall provide to the ENGINEER with each load of LEAN FILL batched and delivered to the job site, before unloading at the site, a delivery ticket on which the information specified in the following table is printed, stamped or written, certifying said LEAN FILL.

TABLE 207

Name of LEAN FILL Supplier
Delivery Ticket Number
Date of Delivery
Contractor
Project (optional)
Design Mix Number
Volume of LEAN FILL in Load
Time Loaded
Batched Weight of Cement
Batched Weight of Fine Aggregate
Batched Weight of Coarse Aggregate
Batched Weight or Volume of Admixtures
Weight or volume (gal.) of water batched/ added at the plant
Reading of Mixer Drum Revolution Counter at the Start of Mixing
Certification that the materials delivered are the same brand, type and source as the materials defined in the reference Design Mix, as authorized by the ENGINEER.
Design Mix Target Proportions
Weight or Volume (gal.) of water added at the site
Weight or Volume of Admixtures Added at the Job Site
Signature & name of person who authorized

the addition of water at the site and
affiliation to project

207.11 TESTS

207.11.1 Lean Fill material tests shall be performed in accordance with the requirements of this specification, the supplemental technical specifications, or as required by the ENGINEER. Testing equipment used in the performance of specified testing shall be calibrated annually with calibration standards traceable to the National Bureau of Standards. Certification records shall be maintained at the laboratory for review by the ENGINEER. A copy of the certifications shall be submitted upon request to the ENGINEER. A test sample shall be taken in the field for each 150 c.y. or each day's placement, whichever is greater. Field testing shall include standard tests for slump, air entrainment, unit weight, temperature, yield and cement factor. A minimum of four (4) compressive strength specimens shall be molded from a single sample. The samples shall be molded in accordance with the requirements of paragraph 207.8. Compressive strength specimens shall not be molded with material used either for slump or air entrainment tests. The cylinders shall be allowed to set for 24 (+/-4) hours in a closed plastic bag and then transported in the molds to the laboratory. The cylinders should be extruded from the molds and moist cured until compressive strength testing. The samples shall be tested for compressive strength in accordance with requirement of ASTM D1633. One specimen shall be tested for compressive strength at seven (7) days, two (2) samples shall be tested for compressive strength at 28 days. Test results shall be reported to the ENGINEER, CONTRACTOR, SUPPLIER, and CoA Pavement & Materials Engineer in writing, within four (4) days of completion of a test. Non-complying test results shall be reported within one working day after completion of a test.

207.11.2 Curing of field strength specimens for acceptance tests shall be conducted in accordance with ASTM C31. Cylinders shall not be cured in a water bath.

207.11.3 Field density/compaction tests in accordance with the requirements of ASTM D2922 and ASTM D3017 shall be taken at the rate of two tests per 150 c.y. of material or fraction thereof placed, as directed by the ENGINEER. The material shall either have an in-place density equal to or greater than 95% of maximum dry density of the combined dry materials as determined under paragraph 207.8, or 24 hours cure, prior to placement of fill, subbase, base course, treated base, pavement or structure.

207.12 TEMPERATURE/ENVIRONMENTAL CONTROLS

207.12.1 When the ambient temperature at the time of placement is less than 40

degrees F, the temperature of the LEAN FILL placed shall not be less than 50 degrees F. The materials shall be cured at a minimum temperature of 40 degrees F for 24 hours after placement.

207.13 PLACEMENT

207.13.1 LEAN FILL shall be placed in lifts not exceeding four (4) feet in height, at time intervals of not less than 1 hour per lift, as authorized by the ENGINEER. Fill shall not be placed to a height above top of pipe exceeding two (2) feet when used to fill a pipe zone, nor placed full depth in a trench to finish subgrade elevation, unless authorized by the ENGINEER. Caution should be taken in placing material in the pipe zone to above the pipe. If the buoyancy of the pipe will result in flotation, the pipe should be anchored or filled with water to counteract the buoyant condition until the LEAN FILL densifies.

207.13.2 LEAN FILL shall not be placed in standing water and shall be protected from flooding for at least 12 hours after placement.

207.13.3 LEAN FILL shall not be placed on either frozen and/or saturated ground.

207.13.4 LEAN FILL shall only be vibrated after placement if required by the ENGINEER.

207.14 MEASUREMENT AND PAYMENT

207.14.1 Unless Lean Fill is specified in the specification or shown on the plans or required by the OWNER, the CONTRACTOR has the option of using Lean Fill in place of conventional backfill and compaction. The Lean Fill material, placement, and the disposal of the excess material generated by the use of the Lean Fill shall be considered incidental to the item of work in which it is used and no separate or direct payment will be made for Lean Fill.

207.14.2 When Lean Fill is specified in the specification or shown on the plans, it shall be measured by the cubic yard, complete in place. Payment for Lean Fill shall be at the contract unit price per cubic yard, complete in place, which shall include all labor, material and equipment required in placing the Lean Fill and removal and disposal of the excess material generated by the use of the Lean Fill.

SECTION 210

OPEN AREA LAND LEVELING

210.1 GENERAL

Open area land leveling shall pertain to leveling of land for public works, park areas, ponding areas behind a dam, athletic fields, or future sites for public facilities. This section defines the requirements for land leveling.

210.2 REFERENCES

210.2.1 This publication:
SECTION 201 SECTION 205
SECTION 204 SECTION 1011

210.3 CONSTRUCTION DRAWINGS

The construction drawings for the project shall define the limit lines of the open area land leveling. Drawings shall also indicate the areas of cut and fill, and percent(s) of compaction required for parts or all of the area.

210.4 CLEARING AND GRUBBING

Clearing, grubbing, and tree removal for the designated open areas shall be completed in accordance with Section 201.

210.5 FILL CONSTRUCTION

Unsuitable on-site materials shall be removed and disposed of per direction of the ENGINEER. Holes, pits, or other depressions may be filled with on-site materials or with suitable borrow material. The fill and borrow construction work shall be accomplished in accordance with Sections 204 and 205.

210.6 GRADING CLASSIFICATIONS

210.6.1 Final grading operations in areas designated for Land Leveling shall comply with the following classifications, as specified on the plans:

210.6.1.1 ROUGH GRADING, when specified, shall produce reasonably uniform surface, free of major rutts, wind-rows and undulations. Finish grades shall match plan grades or contours within $\pm 0.5'$.

210.6.1.2 FINE GRADING, when specified, shall produce a uniform ground surface, free of rutts, wind-rows and undulations. Finish grades shall closely match plan grades or contours within a tolerance of $\pm 0.1'$.

210.6.2 Section 1011 provides specifications for grading and soil preparation in areas specified to receive seeding or sod.

210.7 MEASUREMENT AND PAYMENT

210.7.1 Clearing and grubbing may be measured by the acre for only this operation or may be included in the overall land leveling work. Payment shall be made at the unit price per acre or as otherwise specified in the Bid Proposal.

210.7.2 Open area land leveling may include: clearing and grubbing, fill construction, removal, and disposal of unsuitable materials and providing suitable borrow material. All of this work may be combined into one unit and measured by the acre or in the case of a small site it may be measured as lump sum unit. Payment shall be made at the unit price per acre or lump sum, as specified in the Bid Proposal.

210.7.3 If each of the land leveling operations are to be considered separately, then the measurements and payments would be as follows:

210.7.3.1 Removal and disposal of unsuitable materials will be measured by the cubic yard, as determined by the cross-sectional site drawings. Payment shall be made at the unit price per cubic yard, as defined in the Bid Proposal.

210.7.3.2 Cut and fill operations may be measured by the acre or by the cubic yard, as determined by the cross-sectional site drawings. Payment shall be made at either the unit price per acre or unit price per cubic yard, as indicated in the Bid Proposal.

210.7.3.3 Borrow material shall be measured by the compacted cubic yards, as determined by the cross-sectional site drawings. Payment shall be made at the unit price per compacted cubic yard, as per Bid Proposal.

210.7.4 When select borrow material is required for seeding or sodding of the area, the measurement and payment will be defined in the landscaping section of the project specifications.